

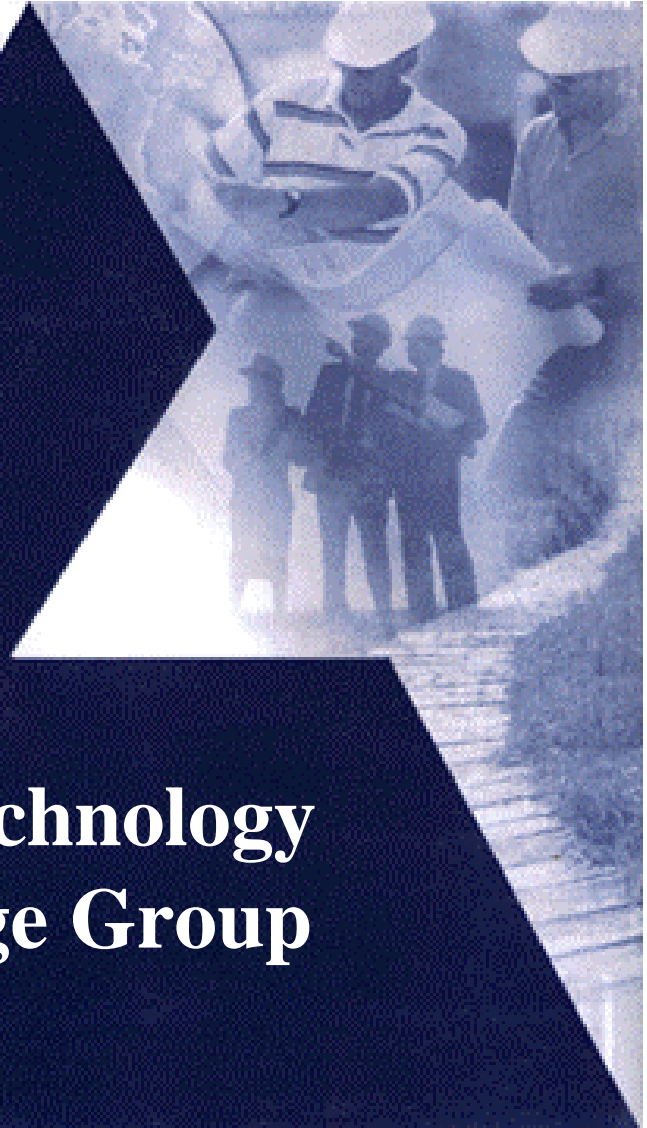
# **POSITIONING FOR THE FUTURE**



LawGibb for the next millennium



## **Joint Technology Exchange Group**



# LAWGIBB Group Organization



**LAW**

**LAWGIBB Group Member** 

Law Engineering and  
Environmental Services, Inc.

**GIBB**

**LAWGIBB Group Member** 

Gibb Ltd.

# LAWGIBB Office Locations



Western Hemisphere

Eastern Hemisphere

## Eastern Hemisphere

# LAWGIBB Group Overview

## **A global leader in engineering and environmental consulting services**

- Ranked 24th globally among all engineering/design firms by ENR<sup>(1)</sup>
- Ranked 19th on “The Top Designers in International Markets” by ENR<sup>(1)</sup>
- Ranked 4th in “The Top 100 U.S. ‘Pure’ Engineers” by ENR<sup>(1)</sup>
- Gibb is ranked 11th among Civil Engineering firms in the UK by NCE<sup>(2)</sup>
- Over 4,000 employees
- Supporting projects with aggregate capital values exceeding \$10 billion

**(1) Engineering News Record; 1999 Rankings**

**(2) New Civil Engineer; 1998 Rankings**

# LAW's Major Business Segments



- Engineered Construction
- Environmental Services
- Facilities Engineering
- Industrial Services

# Representative Projects



## Service

Structural Steel  
Fabrication and Erection,

## Project

CALTRANS

- California Seismic Retrofit Project

# LAW's Major Business Segments



- Engineered Construction
- Environmental Services
- Facilities Engineering
- Industrial Services



# Environmental

- Solid Waste Mgmt
- Water Resources
- Natural Resources
- Environmental Strategy
- EHS / Compliance
- Air Quality
- Risk Assessment
- Information Management
- Property Evaluation Services
- Industrial Process
- Project Management
- Waste Water
- Laboratory
- Remediation
- Hazardous Waste Mgmt
- Engineering & Design

# LAW's Major Business Segments



- Engineered Construction
- Environmental Services
- Facilities Engineering
- Industrial Services

# LAW's Facilities Services

Asset Management Programs

Asbestos/Lead Paint Management

Property Condition Assessment

Building Exteriors - Remedial Resign

Roof Management Programs

Pavement Management

Structural Evaluation/Design

Mechanical Systems Evaluation

Maintenance Management Programs

Indoor Air Quality Studies

Information Management Systems

Water Infiltration Studies

Building Maintenance, Renovation and Repair



## Current or Pending Programs

- ▶ Roofing
  - Disneyland, Charleston, SC, Orange Co. FL, Coca Cola, Delta Airlines
- ▶ Pavements
  - UPS; Hertz; Roadway Express
- ▶ Building Exteriors
  - Extended Stay America, Hilton, Marriott (Ltd.), Promus Hotels.
- ▶ Mechanical Systems
  - Atlanta Airport Terminal Corp.
- ▶ Asbestos & Lead
  - Federal Mogul
- ▶ Asset Management
  - General Motors, Ford Motor, BellSouth, Brevard County, CDC, Bell Atlantic

# LAW's Major Business Segments

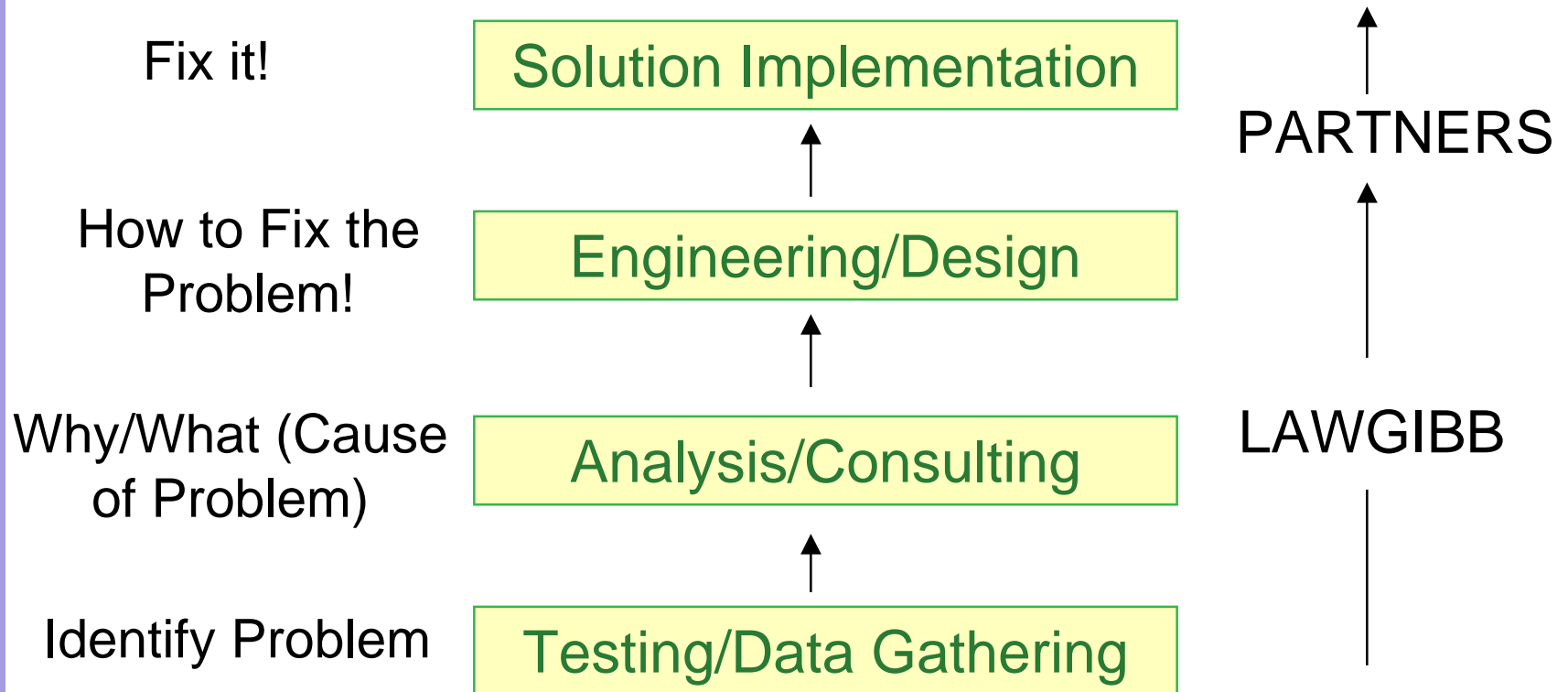


- Engineered Construction
- Environmental Services
- Facilities Engineering
- Industrial Services

# Industrial Services

- Mechanical and Electrical Integrity Programs
- NonDestructive Testing and Evaluation
- Tank and Pressure Vessel Inspection, Engineering and Design
- Welding Evaluation and Procedures
- Infrared Thermography
- Industrial Database Management Systems (IDMS)
- Structural Analysis
- Forensic Engineering
- Failure Analysis
- Process Safety Management (PSM) Programs and Risk Management Plans (RMP's)
- Industrial Safety and Health Training and Program Development
- Hazard Assessments
- Dynamic Balancing of Rotating Equipment
- Corrosion Evaluation
- Product Testing
- Process and Control Systems Design
- Project Management

# Reliability Technology



*“Single-Source Solutions”*

# Client: Teledyne Continental Motors

## Key Services:

Crank shaft failure-- 3200 Aircraft Worldwide

- Forensic & Failure Analysis
- Development of:
  - Procedures (FAA)
  - Test Standards (FAA)
  - Emergency Response (April 17<sup>th</sup>-June 11<sup>th</sup>)
  - Data Management
- Global Field Testing



# Representative Projects

## Client

GENERAL ELECTRIC

- multiple locations



## Service

- Engineering program to evaluate all operational assets and calculate Life Cycle Analysis
- Complete testing and inspection program for OSHA Process Safety Mgmt. Compliance
- Develop written inspection and maintenance procedures

# Industrial Mechanical Integrity

The screenshot displays the 'LAW Engineering and Environmental Services' software interface. The main window is titled 'Pressure Vessel' and contains a 'Pressure Vessels' section with fields for Vessel Number (520.01-0630), Vessel Name (Blow Off Tank), Area (Old Utilities), and Cost Center (5225). It also includes fields for National Board Number, State Serial Number, State Cert. Expiration Date, Rec. Inspection Interval (36 Months), Classification Ranking (3), Expected End of Life, Next Inspection Date (8/26/94), and Return to Service Date (8/26/1981). Below this is an 'Inspection Information' section with tabs for Shell UT Thickness, Shell UT Corrosion, Head UT Thickness, and Head UT Corrosion. The 'Shell UT Thickness' tab is active, showing a table of readings with columns for Point, Distance, Angle, Reading, and Comment. The table contains 8 rows of data. To the right of the table is a 'Readings' section with a 'Close' button. Below the table is a 'Click on a Scan Line to Show Thickness Graph' section, which includes a 'Rotation' graph and a 'Thickness (inches)' graph. The 'Rotation' graph shows a horizontal line at 0 degrees. The 'Thickness' graph shows a line representing thickness over distance, with a legend for Data, Original Thickness, Flag Thickness, and Minimum Thickness. The bottom of the window shows a 'Form View' status bar.

**Pressure Vessel**

**Pressure Vessels**

Vessel Number: 520.01-0630  
Vessel Name: Blow Off Tank  
Area: Old Utilities  
Cost Center: 5225

National Board Number: No Data Plate  
State Serial Number: none  
State Cert. Expiration Date:   
Rec. Inspection Interval: 36 Months

Classification Ranking: 3  
Expected End of Life:   
Next Inspection Date: 8/26/94  
Return to Service Date: 8/26/1981

Manufacturer:   
Location:   
Construction/Dim.:   
Applicable Code:   
Weld Procedures:   
Repair History:   
Relief Valve:   
Operating Conditions:   
Maintenance Proc.:   
Inspections:   
Safety Reqmnts:   
Classification Ranking:

**Inspection Information**

**Pressure Vessel**

**Vessel Ultrasonic Test Information**

Vessel Number: 520.01-0630  
Vessel Name: Blow Off Tank  
Close

**Shell UT Thickness**

Inspection Date: 6/13/75  
6/26/83  
4/7/83  
8/1/93  
6/6/97

**Readings**

Point	Distance	Angle	Reading	Comment
1	0' 2"	0°	0.19749	
2	0' 6"	0°	0.181611	
3	1' 0"	0°	0.195679	
4	1' 6"	0°	0.195660	
5	2' 0"	0°	0.191180	
6	2' 6"	0°	0.184042	
7	3' 0"	0°	0.184705	
8	3' 6"	0°	0.180070	

Click on a Scan Line to Show Thickness Graph

Rotation: 0, 90, 180, 270

Distance: 0, 1, 2, 3, 4, 5

Thickness (inches): 0.00, 0.05, 0.10, 0.15, 0.20, 0.25

Distance (feet): 0, 1, 2, 3, 4, 5

Legend: Data, Original Thickness, Flag Thickness, Minimum Thickness

Form View

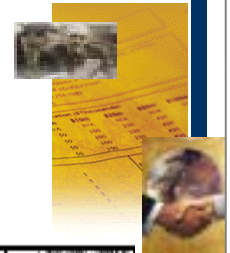
- **Management of inventory, engineering inspection and safety information**
  - Pressure vessels
  - Relief valves
  - Storage tanks
  - Piping systems
- **Clients: Union Camp, Tenneco, Weyerhaeuser, Interstate Paper, and PCR**



*Applying Financial Principles to  
Strategic Facilities Asset Management*

# ARMS Mission

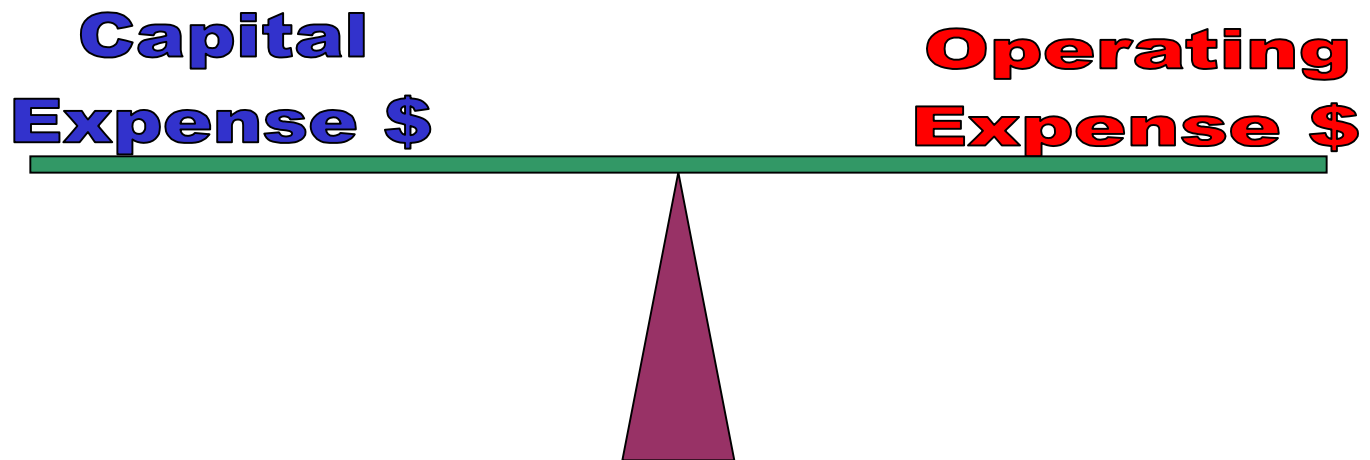
*“Deliver programs that optimize the balance between physical assets’ capital, repair, and maintenance dollars while improving the reliability and life cycle of facility components and infrastructures.”*



Asset Reliability Management Services  
**ARMS**

# ARMS Focus:

To help you optimize (or balance) your  
physical assets' capital, repair, and  
maintenance expenditures



# Definition

Asset Reliability Management Services (ARMS) ...

## Facility Asset Management -

*Providing Facility Services Programs to multi-site facility Corporate clients.*

## Reliability Centered Maintenance -

*Maximizing the value of our clients operations by making their equipment and facilities more reliable.*

# Definition

Facility Asset Management Programs -

**Paving**

**Roofing**

**Mechanical**

**Exteriors**

**Environmental - asbestos/lead/PCB's**

# Definition

## Reliability Centered Maintenance Programs

Pressure Vessels

Rotating Equipment

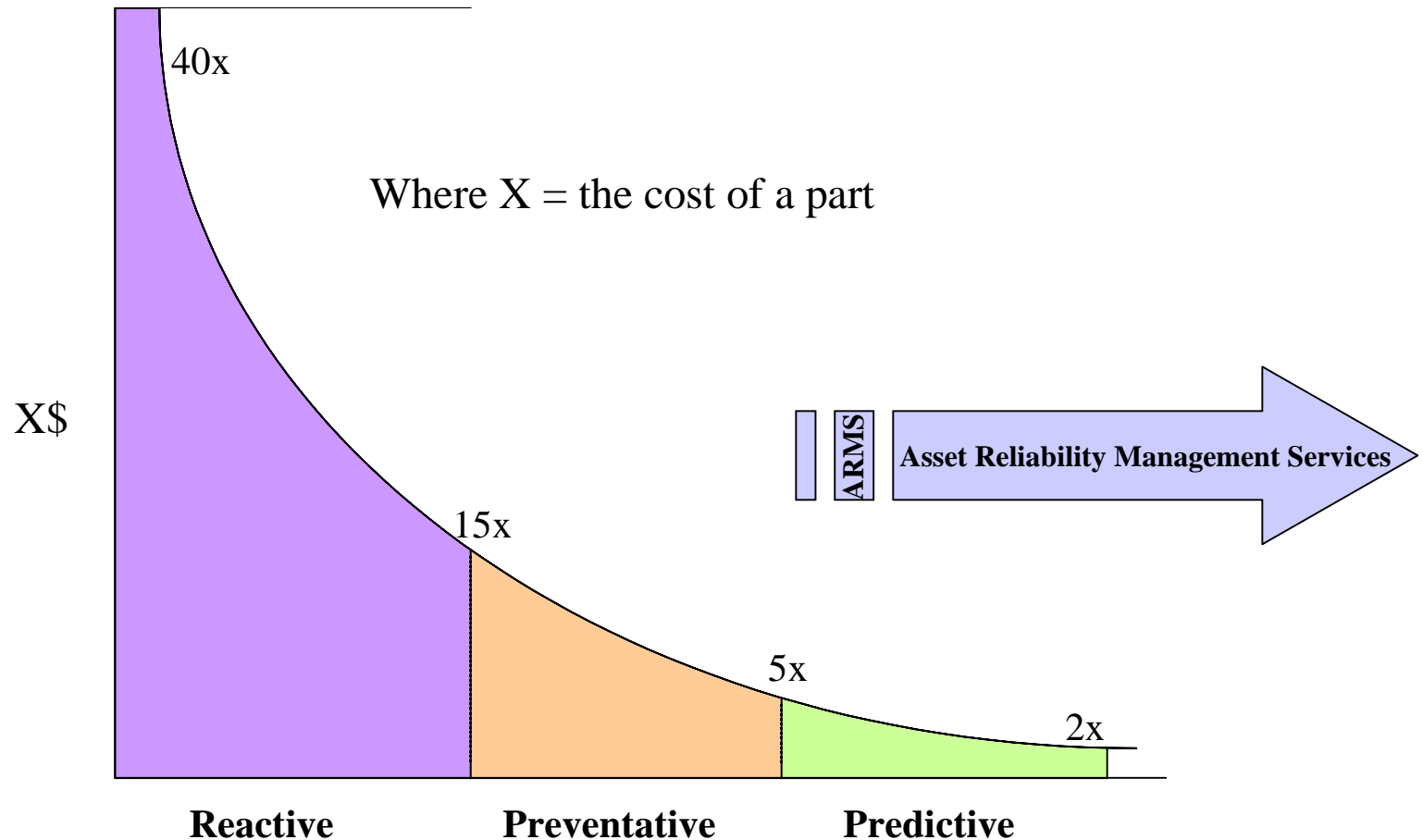
Process Equipment

Conveying Systems

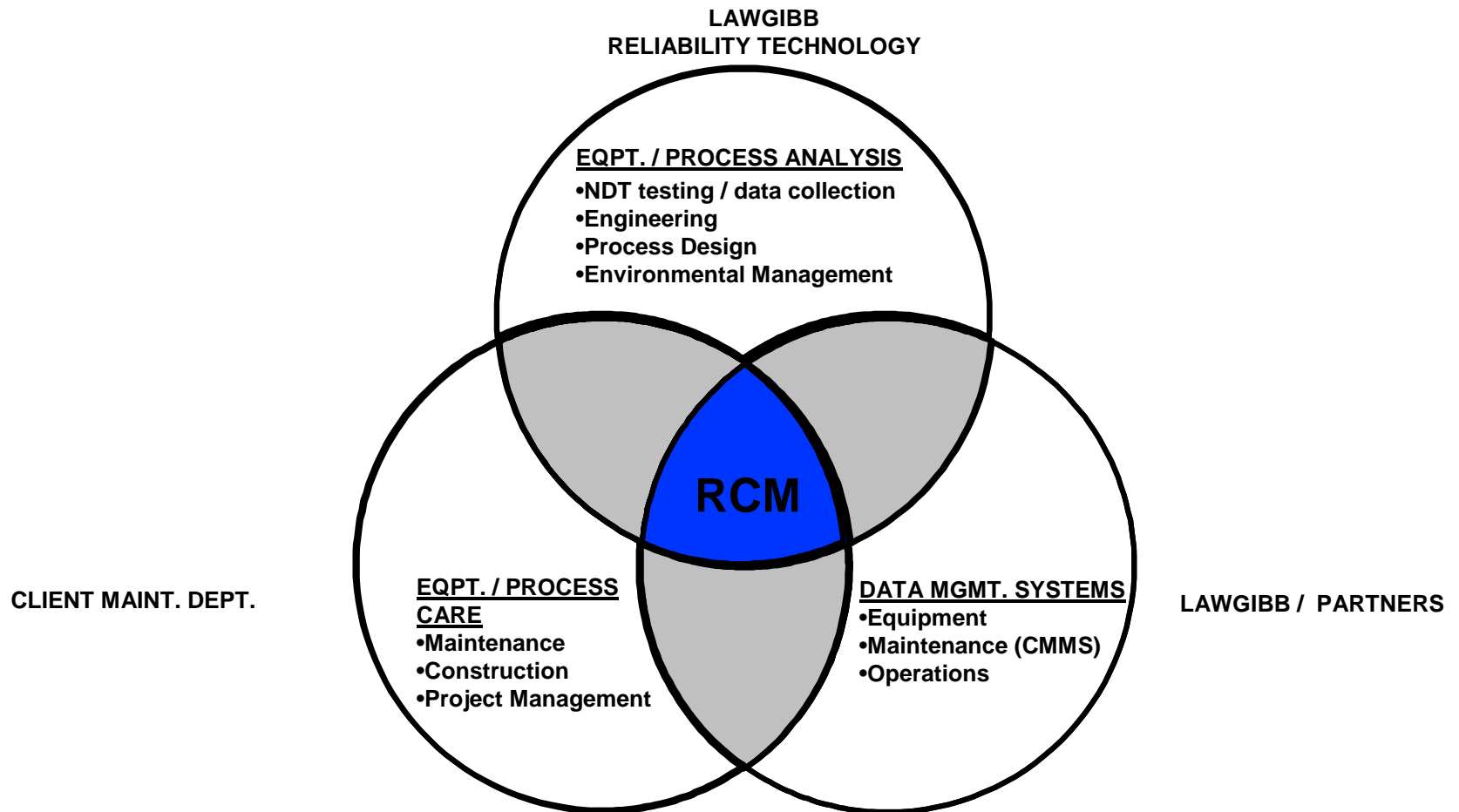
Risk Mmgt. / OSHA Compliance



# Strategic Operational Expense Management



# Reliability- Centered Maintenance



# **Typical ARMS Program Includes**

- **Needs Analysis**
- **Program Design**
- **Asset Inventory**
- **Condition Assessment**
- **Evaluation**
- **Prioritization**
- **Budgeting**
- **Implementation**

# **Failure Mode & Critical Effect Analysis (FMCEA)**

## Identify:

- All key infrastructure systems/sub-systems

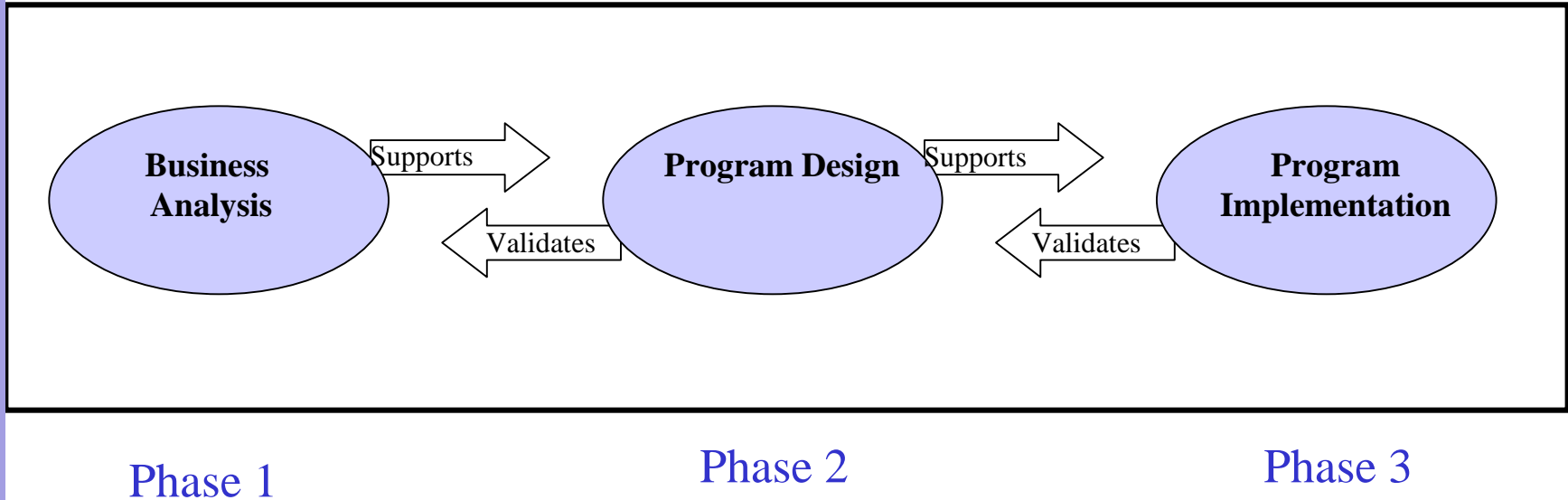
## Assess:

- Severity of Effect
- Occurrence of Failure
- Detection of Defect
- Classification of Failure

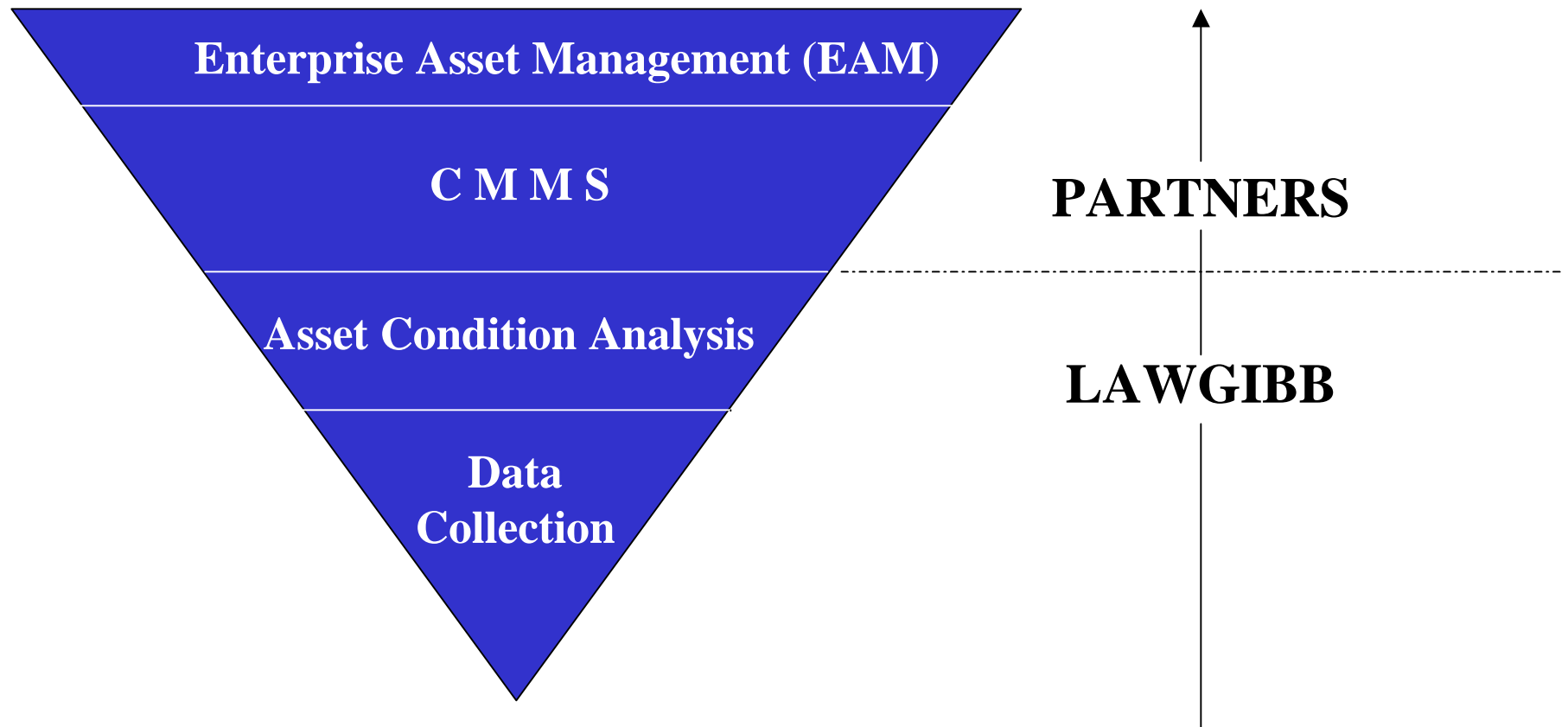
# At the Core of ARMS Offerings:

- **ARMS Best Practices:** Integration of consultative services, technical assessment, engineering solutions, and program management.
- **IT-Enabled Solutions:** In-house expertise, strategic partners, application service providers, systems design, custom applications.

# ARMS Best Practices



# Information Technology for Asset Management



# Business Case for Facility Asset Management

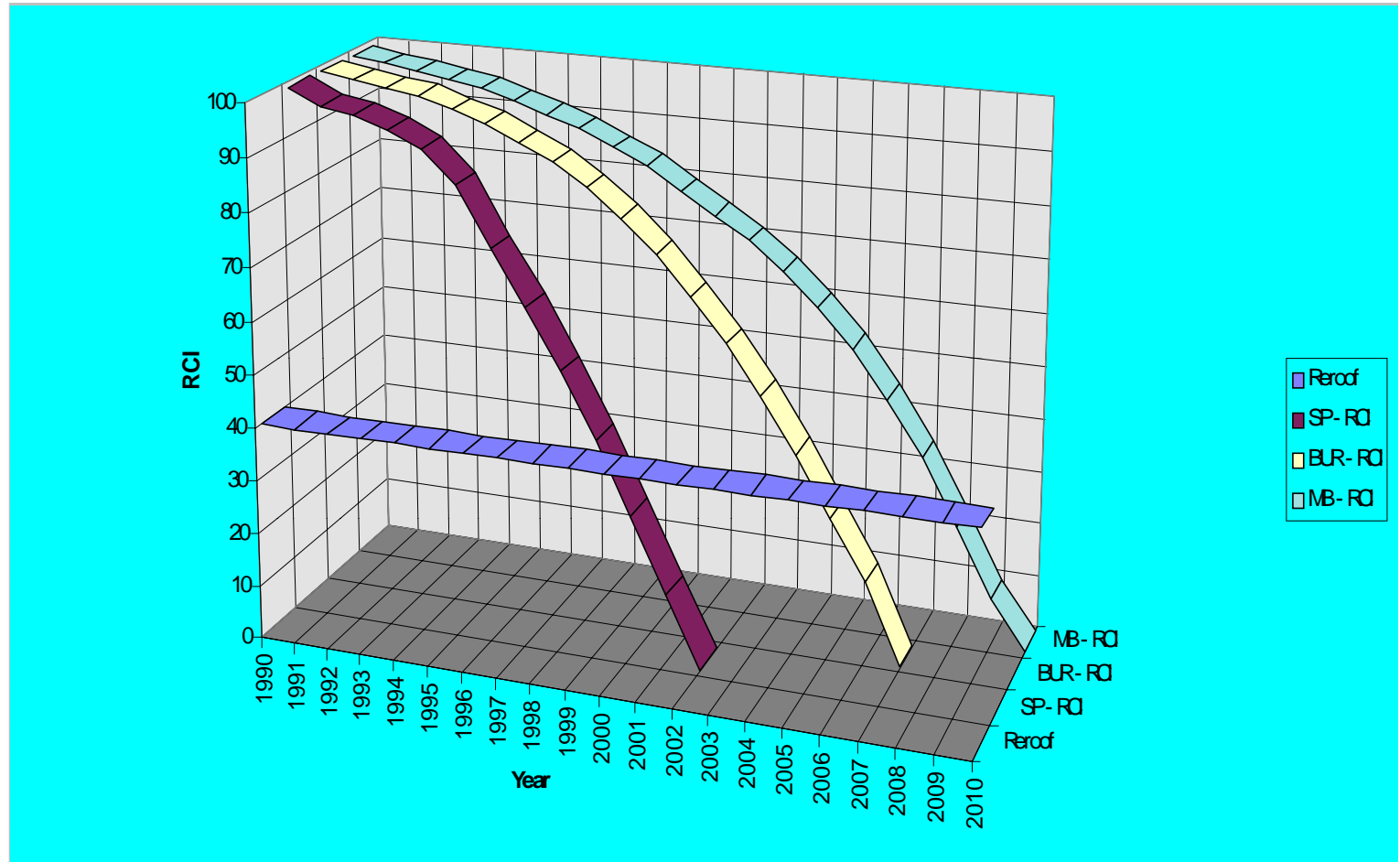
## **EXAMPLE Roof Asset Investment with Positive ROI**

140 Roofs @ ~25k SF each	3,500,000 Total SF
Roof Replacement Cost/SF	\$5.50
Roof Replacement Value	\$19,250,000
Current Age	8 Years
Internal Cost of Capital	8%
Annual Cost of Ownership	\$1,960,655 *
Design Life	20 Years
As-Is Remaining Life	4 Years
Investment Opportunity	\$2,800,000 Strategic Repairs
Adjusted Remaining Life	7 Years
Benefit - Years Added Life	3 Years
ROI	110.07%
Value of ROI	\$3,081,965 (Added Life Value - Investment)

**\*Each Year of Additional Life is worth \$1,960,655**

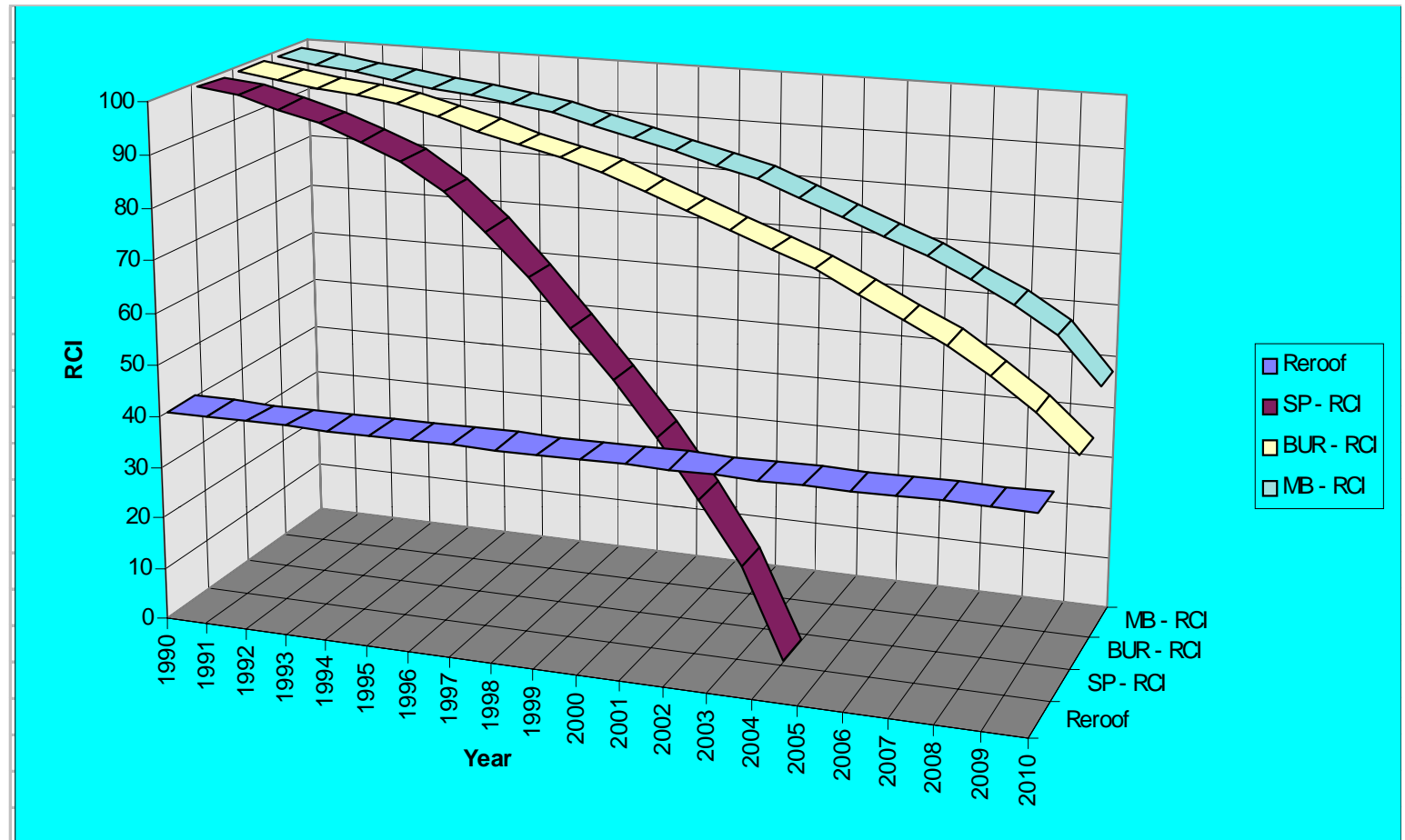


# Roof Deterioration Curve Without Maintenance Program



*\*Brevard County Schools Program, Bravard County, FL*

# Roof Deterioration Curve With Aggressive Maintenance Program



*\*Brevard County Schools Program, Bravard County, FL*

# ARMS Projects

## US Air Force

- ⇒ 12 European Bases
- ⇒ Accessed 3400 buildings
- ⇒ Cross-connection and backflow prevention
- ⇒ Developed and recommended preventive maintenance program

# ARMS Projects

## Aviano Air Base (Italy)

⇒ Worked for USAFE

⇒ Conducted Condition and Compliance Audits for  
Operations and Maintenance

# ARMS Projects

## Kennedy Space Center (SGS)

- ⇒ Inventory/assess enterprise-wide Pressure Vessel Systems
- ⇒ Phase II - Develop Predictive Maintenance Program

# ARMS Projects

## Bowater Paper Co.

- ⇒ Phase I - complete assessment of ALL non-core physical assets.
- ⇒ Phase II - FMEA
- ⇒ Phase III - CMMS-based Predictive Maintenance Program

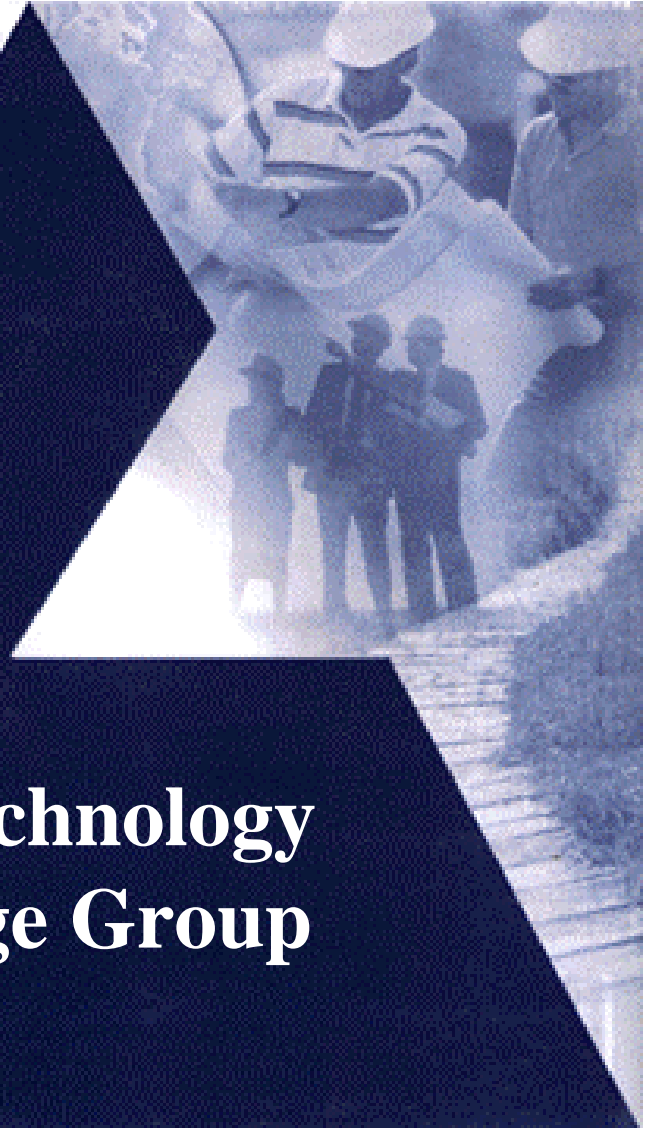
# **POSITIONING FOR THE FUTURE**



LawGibb for the next millennium



## **Joint Technology Exchange Group**



# **Differentiates LAWGIBB?**

**Reputation**

**Stability**

**Unmatched Expertise**

**International Presence**

**Targeted Solutions**

**Strategic Resources**

**Spectrum of Services**